Dow Propylene Glycol USP/EP

General Description

Propylene Glycol USP/EP (PG USP/EP), referring to the United States and European Pharmacopeia, is a high-purity grade of monopropylene glycol for use in pharmaceutical, food, cosmetic, personal care, flavor and fragrance, plus a variety of other applications. The clear, colorless, practically odorless, slightly viscous, water-soluble and hygroscopic liquid with low vapor pressure is produced and handled in compliance with current Good Manufacturing Practice (cGMP) guidelines. PG USP/EP is tested for compliance with the current USP, EP, and Japanese Pharmacopeia (JP) specifications plus the Food Chemical Codex (FCC); it also complies with the Brazilian Pharmacopeia, and other pharmaceutical, cosmetic and food regulations in the global markets where it is sold. It is listed by the Cosmetic, Toiletry and Fragrance Association as an approved ingredient in cosmetics and its use is reviewed by the Cosmetic Ingredient Review (CIR). PG USP/EP is Kosher certified and complies with Halal requirements.

Properties[1] of Propylene Glycol USP/EP

Chemical Name	1,2-Propanediol
Formula	CH_3-CH(OH)-CH_2OH; $C_3H_8O_2$
Molecular Weight	76.10
CAS Number	57-55-6
EINECS Number	200-338-0
Assay	> 99.8% by weight
Water	< 0.2% by weight
Boiling Point, 101.3 kPa (1 atm)	187°C (369°F)
Distillation Range, 101.3 kPa (1 atm)	186–189°C (367°F–372°F)
Vapor Pressure, 20°C (68°F)	0.011 kPa (0.08 mm Hg)
25°C (77°F)	0.017 kPa (0.13 mm Hg)
Freezing Point	Supercools
Pour Point	< -57°C (-71°F)
Specific Gravity 20/20°C (68/68°F)	1.038
25/4°C (77/39°F)	1.033
60/4°C (140/39°F)	1.007
Refractive Index n20/D, 20°C (68°F)	1.4310–1.4330
Viscosity, 25°C (77°F)	48.6 centipoise (mPa.s)
60°C (140°F)	8.4 centipoise (mPa.s)
Specific Heat, 25°C (77°F)	2.51 J/g°K
Surface Tension, 25°C (77°F)	36 mN/m
Flash Point, Pensky-Martens Closed Cup	104°C (220°F)
Autoignition Temperature	371°C (700°F)
Thermal Conductivity, 25°C (77°F)	0.2061 W/m°K
Electrical Conductivity, 25°C (77°F)	10 micro S/m
Heat of Formation	-422 kJ/mol (-101 Kcal/g-mol)
Heat of Vaporization, 25°C (77°F)	67.0 kJ/mol

[1]These data are laboratory results typical of the product, and should not be confused with, or regarded as specifications. For a copy of the sales specification, please contact your Dow representative or visit our web site at www.dowpg.com.

Form No. 117-01619-703CRCG

Home

RCT

Rierden Chemical & Trading Company

email sales@rierdenchemical.com Phone 847-816-9310 Fax 847-816-6364

Back to Product List

Specifications

Propylene Glycol Industrial Grade

Property	Specification
Acidity as Acetic Acid, wt.%	0.005 max.
Appearance	Clear, viscous liquid
Assay as PG (on a dry basis) wt. %	99.0 min.
Chlorides as Cl, wt. ppm	1 max.
Color, Pt-Co, APHA	10 max.
Heavy Metals as Pb, wt. ppm	5 max.
Iron, wt. ppm	1 max.
Suspended Matter	Substantially Free
Water, wt. %	0.2 max.
Distillation:	
IBP@ 760 mmHg, deg. C	185 min.
DP @ 760 mmHg, deg. C	190 max.
Residue on Ignition, wt. %	0.005 max.
Specific Gravity @ 20/20 deg. C	1.0375-1.0390
Refractive Index @ 25 deg. C	1.430 - 1.432

MATERIAL SAFETY DATA SHEET **10957**

Unocal Corporation
1201 West 5th Street, P.O. Box 7600
Los Angeles, California 90051

Product Name: PROPYLENE GLYCOL (ALL GRADES) Page 1
Product Code No: 15680 15379, 15681, 15691 Issue Date: 12/01/89

MANUFACTURER	Transportation Emergencies: CHEMTREC
UNOCAL CHEMICALS DIVISION - PETROCHEM. GROUP UNION OIL COMPANY OF CALIFORNIA 1345 NORTH MEACHAM ROAD SCHAUMBURG, ILLINOIS 60196 CONTACT FOR FURTHER INFORMATION: YOUR LOCAL SALES OFFICE (LAST PAGE)	(800) 424-9300 Cont. U.S. (202) 483-7616 (Collect) from Alaska & Hawaii Health Emergencies: Call LOS ANGELES POISON INFORMATION CENTER (24 hrs) 1-(800)-356-3129

PRODUCT IDENTIFICATION

PRODUCT NAME: PROPYLENE GLYCOL

SYNONYMS:
1,2-DIHYDROXYPROPANE
1,2-PROPYLENE GLYCOL
AMSCO SOLV 5680
METHYLETHYLENE GLYCOL
MONOPROPYLENE GLYCOL
PCN UCD 15680
PCN UCD 5680
PG 12
PROPANE-1,2-DIOL
SIRLENE
TRIMETHYL GLYCOL
UCD 788

GENERIC NAME: VOLATILE SOLVENT

CHEMICAL FAMILY: OXYGENATED HYDROCARBON

DOT PROPER SHIPPING NAME: NONE

ID NUMBER: N/A

DOT HAZARD CLASSIFICATION: NOT REGULATED

SECTION I - COMPONENTS	PERCENT	EXPOSURE LIMIT	UNITS	AGENCY	TYPE

HAZARDOUS COMPONENTS

NO HAZARDOUS COMPONENTS IDENTIFIED AS PER 29 CFR 1910.1200.

OTHER COMPONENTS

PROPYLENE GLYCOL — NOT ESTABLISHED
CAS #: 57-55-6

THIS PRODUCT CONTAINS THE FOLLOWING CHEMICALS SUBJECT TO THE REPORTING REQUIREMENTS OF SARA 313 AND 40 CFR 372: CAS NUMBER WEIGHT %

--NONE--

SECTION II - EMERGENCY AND FIRST AID PROCEDURES

EMERGENCY
Have physician call LOS ANGELES POISON INFORMATION CENTER (24 hrs) (800) 356-3129

EYE CONTACT:

IF IRRITATION OR REDNESS DEVELOPS, MOVE VICTIM AWAY FROM EXPOSURE AND INTO FRESH AIR. FLUSH EYES WITH CLEAN WATER. IF SYMPTOMS PERSIST, SEEK MEDICAL ATTENTION.

SKIN CONTACT:

REMOVE CONTAMINATED SHOES AND CLOTHING AND CLEANSE AFFECTED AREA(S) THOROUGHLY BY WASHING WITH MILD SOAP AND WATER. IF IRRITATION OR REDNESS DEVELOPS AND PERSISTS, SEEK MEDICAL ATTENTION.

INHALATION (BREATHING):

IF RESPIRATORY SYMPTOMS DEVELOP, MOVE VICTIM AWAY FROM SOURCE OF EXPOSURE AND INTO FRESH AIR. IF SYMPTOMS PERSIST, SEEK MEDICAL ATTENTION. IF VICTIM IS NOT BREATHING, IMMEDIATELY BEGIN ARTIFICIAL RESPIRATION. IF BREATHING DIFFICULTIES DEVELOP, OXYGEN SHOULD BE ADMINISTERED BY QUALIFIED PERSONNEL. SEEK IMMEDIATE MEDICAL ATTENTION.

INGESTION (SWALLOWING):

NO FIRST AID IS NORMALLY REQUIRED; HOWEVER, IF SWALLOWED, AND SYMPTOMS DEVELOP, SEEK MEDICAL ATTENTION.

SECTION III - HEALTH HAZARDS/ROUTES OF ENTRY

EYE CONTACT:

THIS MATERIAL MAY CAUSE MILD EYE IRRITATION. DIRECT CONTACT WITH THE LIQUID OR EXPOSURE TO VAPORS OR MISTS MAY CAUSE STINGING, TEARING AND REDNESS.

SKIN CONTACT:

THIS MATERIAL MAY CAUSE MILD SKIN IRRITATION. PROLONGED OR REPEATED CONTACT MAY CAUSE REDNESS, BURNING, AND DRYING AND CRACKING OF THE SKIN. CONTACT MAY RESULT IN SKIN ABSORPTION BUT SYMPTOMS OF TOXICITY ARE NOT ANTICIPATED BY THIS ROUTE ALONE UNDER NORMAL CONDITIONS OF USE. PERSONS WITH PRE-EXISTING SKIN DISORDERS MAY BE MORE SUSCEPTIBLE TO THE EFFECTS OF THIS MATERIAL.

INHALATION (BREATHING):

BECAUSE OF ITS LOW VOLATILITY, EXPOSURE TO VAPORS IS UNLIKELY. HOWEVER, VAPORS OR MISTS PRODUCED UNDER CERTAIN CONDITIONS OF USE MAY CAUSE SIGNS OF NERVOUS SYSTEM DEPRESSION (E.G., HEADACHE, DROWSINESS, DIZZINESS, LOSS OF COORDINATION, AND FATIGUE).

INGESTION (SWALLOWING):

WHILE THIS MATERIAL HAS A LOW DEGREE OF TOXICITY, INGESTION OF EXCESSIVE QUANTITIES MAY CAUSE SIGNS OF NERVOUS SYSTEM DEPRESSION (E.G., HEADACHE, DROWSINESS, DIZZINESS, LOSS OF COORDINATION, AND FATIGUE).

COMMENTS:

THIS MATERIAL HAS NOT BEEN IDENTIFIED AS A CARCINOGEN BY NTP, IARC OR OSHA. REPORTS HAVE ASSOCIATED REPEATED AND PROLONGED OCCUPATIONAL OVEREXPOSURE TO SOLVENTS WITH PERMANENT BRAIN AND NERVOUS SYSTEM DAMAGE (SOMETIMES REFERRED TO AS SOLVENT OR PAINTERS' SYNDROME). INTENTIONAL MISUSE BY DELIBERATELY CONCENTRATING AND INHALING THIS PRODUCT MAY BE HARMFUL OR FATAL.

SECTION IV - SPECIAL PROTECTION INFORMATION

VENTILATION:

IF CURRENT VENTILATION PRACTICES ARE NOT ADEQUATE TO MINIMIZE EXPOSURE, ADDITIONAL VENTILATION OR EXHAUST SYSTEMS MAY BE REQUIRED. WHERE EXPLOSIVE MIXTURES MAY BE PRESENT, ELECTRICAL SYSTEMS SAFE FOR SUCH LOCATIONS MUST BE USED.

RESPIRATORY PROTECTION:

RESPIRATORY PROTECTION MAY BE NECESSARY TO MINIMIZE EXPOSURE. DEPENDING ON THE NATURE AND CONCENTRATION OF THE AIRBORNE MATERIAL, USE A RESPIRATOR OR GAS MASK WITH APPROPRIATE CARTRIDGES AND CANNISTERS (NIOSH APPROVED, IF AVAILABLE) OR SUPPLIED AIR EQUIPMENT.

PROTECTIVE GLOVES:

THE USE OF GLOVES IMPERMEABLE TO THE SPECIFIC MATERIAL HANDLED IS ADVISED TO PREVENT SKIN CONTACT AND POSSIBLE IRRITATION.

EYE PROTECTION:

APPROVED EYE PROTECTION TO SAFEGUARD AGAINST POTENTIAL EYE CONTACT, IRRITATION OR INJURY IS RECOMMENDED.

OTHER PROTECTIVE EQUIPMENT:

IT IS SUGGESTED THAT A SOURCE OF CLEAN WATER BE AVAILABLE IN THE WORK AREA FOR FLUSHING EYES AND SKIN. IMPERVIOUS CLOTHING SHOULD BE WORN AS NEEDED.

SECTION V - REACTIVITY DATA

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS OF STORAGE AND HANDLING.

CONDITIONS AFFECTING REACTIVITY:

NONE KNOWN

INCOMPATIBLE MATERIALS:

NONE KNOWN.

HAZARDOUS DECOMPOSITION PRODUCTS:

COMBUSTION MAY YIELD CARBON MONOXIDE AND/OR CARBON DIOXIDE. DO NOT BREATHE SMOKE OR FUMES. WEAR APPROPRIATE PROTECTIVE EQUIPMENT.

HAZARDOUS POLYMERIZATION:

WILL NOT OCCUR

POLYMERIZATION CONDITIONS TO AVOID:

NONE KNOWN

SECTION VI - SPILL AND LEAK PROCEDURES

HIGHWAY OR RAILWAY SPILLS
Call CHEMTREC (800) 424-9300 Cont. U.S.
(Collect) (202) 483-7616 from Alaska & Hawaii

PRECAUTIONS IN CASE OF RELEASE OR SPILL:

MAY IGNITE. KEEP ALL SOURCES OF IGNITION AWAY FROM SPILL/RELEASE. STAY UPWIND AND AWAY FROM SPILL/RELEASE. ISOLATE HAZARD AREA AND LIMIT ENTRY TO AUTHORIZED PERSONNEL. STOP SPILL/RELEASE IF IT CAN BE DONE WITHOUT RISK. WEAR APPROPRIATE PROTECTIVE EQUIPMENT INCLUDING RESPIRATORY PROTECTION AS CONDITIONS WARRANT (SEE SECTION IV). PREVENT SPILLED MATERIAL FROM ENTERING SEWERS, STORM DRAINS, OTHER UNAUTHORIZED TREATMENT DRAINAGE SYSTEMS AND NATURAL WATERWAYS. DIKE FAR AHEAD OF SPILL FOR LATER RECOVERY OR DISPOSAL. SPILLED MATERIAL MAY BE ABSORBED INTO AN APPROPRIATE ABSORBENT MATERIAL. USE WATER SPARINGLY TO REDUCE DISPOSAL REQUIREMENTS. NOTIFY FIRE AUTHORITIES AND APPROPRIATE FEDERAL, STATE AND LOCAL AGENCIES. IMMEDIATE CLEANUP OF ANY SPILL IS RECOMMENDED.

WASTE DISPOSAL METHOD:

DISPOSE OF PRODUCT IN ACCORDANCE WITH LOCAL, COUNTY, STATE, AND FEDERAL REGULATIONS.

SECTION VII - STORAGE AND SPECIAL PRECAUTIONS

HANDLING AND STORAGE PRECAUTIONS:

USE AND STORE THIS MATERIAL IN COOL, DRY, WELL VENTILATED AREAS AWAY FROM HEAT AND ALL SOURCES OF IGNITION. KEEP CONTAINER(S) CLOSED. STORE ONLY IN APPROVED CONTAINERS. KEEP AWAY FROM ANY INCOMPATIBLE MATERIALS (SEE SECTION V). PROTECT CONTAINER(S) AGAINST PHYSICAL DAMAGE. DO NOT ENTER CONFINED SPACES SUCH AS TANKS OR PITS WITHOUT FOLLOWING PROPER ENTRY PROCEDURES SUCH AS ASTM D-4276. THE USE OF RESPIRATORY PROTECTION IS ADVISED WHEN CONCENTRATIONS EXCEED ANY ESTABLISHED EXPOSURE LIMITS (SEE SECTIONS I AND IV). WASH THOROUGHLY AFTER HANDLING. DO NOT WEAR CONTAMINATED CLOTHING OR SHOES. USE GOOD PERSONAL HYGIENE PRACTICE. "EMPTY" CONTAINERS RETAIN RESIDUE (LIQUID AND/OR VAPOR) AND CAN BE DANGEROUS. DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS OR OTHER SOURCES OF IGNITION; THEY MAY EXPLODE AND CAUSE INJURY OR DEATH. "EMPTY" DRUMS SHOULD BE COMPLETELY DRAINED, PROPERLY BUNGED AND PROMPTLY SHIPPED TO THE SUPPLIER OR A DRUM RECONDITIONER. ALL OTHER CONTAINERS SHOULD BE DISPOSED OF IN AN ENVIRONMENTALLY SAFE MANNER AND IN ACCORDANCE WITH GOVERNMENTAL REGULATIONS. BEFORE WORKING ON OR IN TANKS WHICH CONTAIN OR HAVE CONTAINED THIS PRODUCT, REFER TO OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION REGULATIONS, ANSI Z49.1, AND OTHER GOVERNMENTAL AND INDUSTRIAL REFERENCES PERTAINING TO CLEANING, REPAIRING, WELDING, OR OTHER CONTEMPLATED OPERATIONS.

SECTION VIII - FIRE AND EXPLOSION HAZARD DATA

NFPA HAZARD CLASS			HAZARD RANKING	FLASH POINT
	HEALTH HAZARD:	0	0 - LEAST	
	FLAMMABILITY:	1	1 - SLIGHT	
	REACTIVITY:	0	2 - MODERATE	214 F (TCC)
	OTHER:		3 - HIGH	
			4 - EXTREME	

LOWER EXPLOSIVE LIMIT (% VOL.)	UPPER EXPLOSIVE LIMIT (% VOL.)
2.6	12.5

EXTINGUISHING MEDIA:

DRY CHEMICAL, CARBON DIOXIDE, HALON, POLAR OR ALCOHOL FOAM, OR WATER SPRAY IS RECOMMENDED. WATER MAY BE INEFFECTIVE.

SECTION VIII - FIRE AND EXPLOSION HAZARD DATA

UNUSUAL FIRE & EXPLOSION HAZARDS:

THIS MATERIAL MAY BURN, BUT WILL NOT IGNITE READILY. IF CONTAINER IS NOT PROPERLY COOLED, IT MAY EXPLODE IN THE HEAT OF A FIRE. VAPORS ARE HEAVIER THAN AIR AND MAY ACCUMULATE IN LOW AREAS.

SPECIAL FIRE FIGHTING PROCEDURES:

WEAR APPROPRIATE PROTECTIVE EQUIPMENT INCLUDING RESPIRATORY PROTECTION AS CONDITIONS WARRANT (SEE SECTION IV). STOP SPILL/RELEASE IF IT CAN BE DONE WITHOUT RISK. MOVE UNDAMAGED CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. WATER SPRAY MAY BE USEFUL IN MINIMIZING OR DISPERSING VAPORS AND COOLING EQUIPMENT EXPOSED TO HEAT AND FLAME. AVOID SPREADING BURNING LIQUID WITH WATER USED FOR COOLING PURPOSES.

SECTION IX - PHYSICAL DATA

***UNLESS OTHERWISE NOTED, VALUES ARE AT 20 C/68 F AND 760 mm Hg/1 atm.

APPROX BOILING POINT	(AIR = 1) VAPOR DENSITY	(N-BUTYL ACETATE = 1) EVAPORATION RATE	% VOLATILE
369 F	2.6	<0.01	NEGLIGIBLE

% SOLUBILITY IN WATER	VAPOR PRESSURE (mm Hg)
100	NEGLIGIBLE

SPECIFIC GRAVITY	APPROX. BULK DENSITY (lb/gal)
1.038	8.64

APPEARANCE

CLEAR, LITTLE IF ANY COLOR, LIQUID

ODOR

CHARACTERISTIC

SECTION X - PRECAUTIONARY WARNING

FIRST AID: IN CASE OF CONTACT, FLUSH EYES OR SKIN WITH PLENTY OF WATER. IF SWALLOWED, FIRST AID IS NOT NORMALLY REQUIRED.

SECTION XI - DOCUMENTARY INFORMATION

ISSUE DATE: 12/01/89 PRODUCT CODE NO. 15680

PREV. DATE: 06/17/87 PREV. PROD. CODE NO. 5680

MSDS NO: 6298 PREV. MSDS NO: 788

SECTION XI - DOCUMENTARY INFORMATION

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES

The information in this document is believed to be correct as of the date issued. HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THIS INFORMATION, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THIS PRODUCT, OR THE HAZARDS RELATED TO ITS USE. This information and product are furnished on the condition that the person receiving them shall make his own determination as to the suitability of the product for his particular purpose and on the condition that he assume the risk of his use thereof.

FOR FURTHER INFORMATION, CONTACT YOUR LOCAL SALES OFFICE

ATLANTA	(404) 934-0343 (800) 633-2362
BALTIMORE (Outside MD)	(301) 355-2737 (800) 638-7676
BIRMINGHAM (Outside AL) (Inside AL)	(205) 995-9776 (800) 328-1611 (800) 328-1610
CHARLOTTE (NC Only) (SC, GA, VA)	(704) 588-2633 (800) 532-6103 (800) 438-2968
CHICAGO	(708) 257-9300
CINCINNATI	(513) 422-0176
CLEVELAND	(216) 425-4600
DALLAS/FT.WRTH	(214) 298-8233
DETROIT	(313) 772-0870
HOUSTON	(713) 643-3517
KANSAS CITY	(816) 231-7600
LOS ANGELES	(714) 228-4700
MIAMI (FL Only) (FL Only)	(305) 634-2411 (800) 621-3841 (800) 282-0537
NASHVILLE (TN Only)	(615) 320-5474 (800) 325-7685
NY/NJ (NY Only)	(201) 574-9890 (800) 526-4376
PHILADELPHIA CONSHOHOCKEN	(215) 753-1903 (215) 828-1010
NEW ENGLAND	(401) 438-7240 (800) 523-0725
SAN FRANCISCO/ OAKLAND AREA	(415) 562-1976
TWIN CITIES	(612) 227-8020
WICHITA	(316) 838-3335

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MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MATHESON TRI-GAS, INC.
959 ROUTE 46 EAST
PARSIPPANY, NEW JERSEY 07054-0624

EMERGENCY CONTACT:
CHEMTREC 1-800-424-9300
INFORMATION CONTACT:
973-257-1100

SUBSTANCE: TRIFLUOROIODOMETHANE

TRADE NAMES/SYNONYMS:
TRIFLUOROMETHYL IODIDE; IODOTRIFLUOROMETHANE; MONOIODOTRIFLUOROMETHANE; PERFLUOROMETHYL IODIDE; CF3I; 00229444

CHEMICAL FAMILY: halogenated

CREATION DATE: Feb 26 2003
REVISION DATE: Mar 19 2003

2. COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: TRIFLUOROIODOMETHANE
CAS NUMBER: 2314-97-8
PERCENTAGE: 100

3. HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=0 REACTIVITY=0

EMERGENCY OVERVIEW:
PHYSICAL FORM: gas
MAJOR HEALTH HAZARDS: respiratory tract irritation, skin irritation, eye irritation
PHYSICAL HAZARDS: Containers may rupture or explode if exposed to heat.

POTENTIAL HEALTH EFFECTS:
INHALATION:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: no information on significant adverse effects
SKIN CONTACT:
SHORT TERM EXPOSURE: irritation

LONG TERM EXPOSURE: irritation
EYE CONTACT:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: irritation
INGESTION:
SHORT TERM EXPOSURE: ingestion of harmful amounts is unlikely
LONG TERM EXPOSURE: ingestion of harmful amounts is unlikely

4. FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.

SKIN CONTACT: Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.

EYE CONTACT: Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

INGESTION: If a large amount is swallowed, get medical attention.

5. FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Negligible fire hazard. Containers may rupture or explode if exposed to heat.

EXTINGUISHING MEDIA: carbon dioxide, regular dry chemical

Large fires: Use regular foam or flood with fine water spray.

FIRE FIGHTING: Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. For tank, rail car or tank truck, evacuation radius: 800 meters (1/2 mile). Use extinguishing agents appropriate for surrounding fire. Cool containers with water spray until well after the fire is out. Apply water from a protected location or from a safe distance. Do not get water directly on material. Reduce vapors with water spray. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas. Consider downwind evacuation if material is leaking.

6. ACCIDENTAL RELEASE MEASURES

OCCUPATIONAL RELEASE:
Stop leak if possible without personal risk. Keep unnecessary people away, isolate hazard area and deny entry. Stay upwind and keep out of low areas.

7. HANDLING AND STORAGE

STORAGE: Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. Keep separated from incompatible substances.

8. EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:
TRIFLUOROIODOMETHANE:
No occupational exposure limits established.

VENTILATION: Provide local exhaust ventilation system. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear splash resistant safety goggles with a faceshield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area. Eye protection not required, but recommended.

CLOTHING: Wear appropriate chemical resistant clothing. Protective clothing is not required.

GLOVES: Wear appropriate chemical resistant gloves.

RESPIRATOR: Under conditions of frequent use or heavy exposure, respiratory protection may be needed. Respiratory protection is ranked in order from minimum to maximum. Consider warning properties before use.
For Unknown Concentrations or Immediately Dangerous to Life or Health -
Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.
Any self-contained breathing apparatus with a full facepiece.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: gas
ODOR: Not available
MOLECULAR WEIGHT: 195.91
MOLECULAR FORMULA: C-F3-I
BOILING POINT: -9 F (-23 C)
FREEZING POINT: Not available
VAPOR PRESSURE: Not available

VAPOR DENSITY: Not available
DENSITY: Not available
WATER SOLUBILITY: Not available
PH: Not applicable
VOLATILITY: Not applicable
ODOR THRESHOLD: Not available
EVAPORATION RATE: Not applicable
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not applicable

10. STABILITY AND REACTIVITY

REACTIVITY: Stable at normal temperatures and pressure.

CONDITIONS TO AVOID: Protect from physical damage and heat. Containers may rupture or explode if exposed to heat.

INCOMPATIBILITIES: oxidizing materials

HAZARDOUS DECOMPOSITION:
Thermal decomposition products: acid halides, oxides of carbon

POLYMERIZATION: Will not polymerize.

11. TOXICOLOGICAL INFORMATION

TRIFLUOROIODOMETHANE:
LOCAL EFFECTS:
Irritant: inhalation, skin, eye

12. ECOLOGICAL INFORMATION

Not available

13. DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable regulations.

14. TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:
PROPER SHIPPING NAME: Compressed gas, n.o.s. (TRIFLUOROIODOMETHANE)
ID NUMBER: UN1956
HAZARD CLASS OR DIVISION: 2.2
LABELING REQUIREMENTS: 2.2

CANADIAN TRANSPORTATION OF DANGEROUS GOODS:
SHIPPING NAME: Compressed gas, n.o.s. (TRIFLUOROIODOMETHANE)
UN NUMBER: UN1956
CLASS: 2.2

15. REGULATORY INFORMATION

U.S. REGULATIONS:
CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4): Not regulated.

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30): Not regulated.

SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.40): Not regulated.

SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370.21):
ACUTE: Yes
CHRONIC: No
FIRE: No
REACTIVE: No
SUDDEN RELEASE: Yes

SARA TITLE III SECTION 313 (40 CFR 372.65): Not regulated.

OSHA PROCESS SAFETY (29CFR1910.119): Not regulated.

STATE REGULATIONS:
California Proposition 65: Not regulated.

CANADIAN REGULATIONS:
WHMIS CLASSIFICATION: Not determined.

NATIONAL INVENTORY STATUS:
U.S. INVENTORY (TSCA): Listed on inventory.

TSCA 12(b) EXPORT NOTIFICATION: Not listed.

CANADA INVENTORY (DSL/NDSL): Not determined.

16. OTHER INFORMATION

MATHESON TRI-GAS, INC. MAKES NO EXPRESS OR IMPLIED WARRANTIES, GUARANTEES OR REPRESENTATIONS REGARDING THE PRODUCT OR THE INFORMATION HEREIN, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR USE. MATHESON TRI-GAS, INC. SHALL NOT BE LIABLE FOR ANY PERSONAL INJURY, PROPERTY OR OTHER DAMAGES OF ANY NATURE, WHETHER COMPENSATORY, CONSEQUENTIAL, EXEMPLARY, OR OTHERWISE, RESULTING FROM ANY PUBLICATION, USE OR RELIANCE UPON THE INFORMATION HEREIN.

SETTING THE OCCUPATIONAL EXPOSURE LIMIT FOR CF_3I*

Stephanie R. Skaggs
ICF Incorporated
Albuquerque, NM 87111 USA

Reva Rubenstein
Stratospheric Protection Division
US Environmental Protection Agency
Washington, DC 20460 USA

Occupational exposure limits are established by a number of organizations. The establishment of an occupational exposure limit involves examining the hazard levels associated with the exposure to a chemical. The hazard profile is determined by performing a battery of toxicity tests, the exact nature of which are dependant on the chemical in question. An example of a test battery would include such tests as acute toxicity tests (limit test, but not necessarily an LC_{50}), genotoxicity battery of tests, subchronic tests, and developmental toxicity tests.

A number of toxicity studies have been performed on trifluoroiodomethane (CF_3I). These toxicity tests have been independently evaluated by ICF Incorporated for the US Environmental Protection Agency and have been found adequate to establish an acceptable "Occupational Exposure Limit" (OEL) for CF_3I. This paper presents the recommended time-weighted average and ceiling OEL as well as the basis and justification for these values. Also, this paper addresses how one utilizes these OELs to assure safe production, transfer, use. and storage of the chemical.

RECOMMENDED ACCEPTABLE OCCUPATIONAL EXPOSURE LIMIT

The recommended time-weighted average (TWA) OEL for CF_3I is 150 ppm. The ceiling limit for CF_3I is 2000 ppm. The TWA OEL applies to chronic or repeated exposures such as those that might be experienced in manufacturing, cylinder filling or transfer operations, or agent recycling operations. The TWA OEL is established to provide guidance to personnel who might he exposed for 8 hrs/day, 40 hrs/wk, over a 35-year work span. The TWA OEL is not applicable to firefighting situations because firefighting situations generally involve infrequent, if not once-in-a-lifetime exposures. Therefore, the ceiling OEL is applied to a firefighting setting and represents a level not to he exceeded for any period of time. The ceiling OEL would also apply to accidental discharge scenarios of fire extinguisher cylinders and storage containers.

Basis for the Time-Weighted Average

A number of toxicological studies were considered when establishing this OEL [1,2,3,4,5,6,7]. Two endpoints in particular were the main focus for setting the TWA OEL (Figure 1): Thyroid hormone alterations and non-dose related, inconsistent changes in male to female pup ratio [I].

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* Based on a report by Harvey Clewell and Greg Lawrence, *Recommendation for an Acceptable Exposure Limit for CF_3I*, ICF Incorporated, for US Environmental Protection Agency, Washington, DC, 1998.

increases in micronucleus frequency and decreases in PCE/NCE ratios were observed in all treated groups, with statistically significant trends also reported for each endpoint. However, in a study by Dodd et al. [1] where male and female rats were exposed to 0, 0.2, 0.7 or 2.0% CF_3I (0, 2000, 7000 or 20,000 ppm) via whole-body inhalation for 7 or 14 weeks, there were no statistically significant changes in micronuclei frequency or in PCE/NCE ratios.

Because the results of these genotoxicity screening tests were mixed, there is an indication that CF_3I might produce mutagenic or carcinogenic effects. Nevertheless, it would be premature *to* assume that, based on the results of these genotoxicity tests, CF_3I is a carcinogen. An accurate assessment of the potential carcinogenicity of CF_3I would require data from a two-year bioassay. However, given the proposed uses of the material as a fire suppressant, exposures (apart from manufacturing) would be rare. or at least infrequent, rather than chronic. Thus, even if CF_3I were found to have a relatively high carcinogenic potency, which appears unlikely given the dose-response for the micronucleus assays, such infrequent exposures would not result in a significant cumulative lifetime risk of carcinogenic effects. Therefore, a general conclusion that CF_3I should not be used as a fire suppressant based on its possible genotoxicity would not be appropriate.

APPLYING OELS

As is the case with all potential chemical exposures, it is the duty of industrial hygienist and chemical safety officers to protect the health of their workers by limiting exposure to chemicals. Safety professionals limit exposure by using common sense. good practice industrial hygiene procedures such as ventilation, or engineering controls.

To determine the safe use of a chemical, the safety professional compares the concentration at which personnel might be exposed to the acceptable exposure limit or OEL. In the case of potential repeated, long-term exposures as might he experienced during the manufacturing process and during cylinder or extinguisher filling for CF_3I, the TWA OEL is compared to measured or predicted exposure concentrations in the workplace. For example, at one extinguisher filling plant, typical exposure concentrations range between 22 and 67 ppm, well below the TWA OEL of 150 ppm.

The TWA OEL is not applicable to firefighting situations. In total-flooding applications, CF_3I is designed to be used in "not normally occupied" applications; thus personnel would not be exposed during firefighting situations. In streaming applications, the manual direction of the stream helps limit the exposure of personnel. Residual breathing zone firefighter measurements of CF_3I in a number of handheld trails using 2.5 to 13-pound extinguishers indicates that a firefighter might be exposed to concentrations ranging between 6 and 1700 ppm, again below the acceptable ceiling OEL.

CONCLUSIONS

An adequate database of toxicological testing exists to assess the hazards associated with exposure to CF_3I adequately. Although additional tests would be useful to characterize more fully the mechanism of action and explore certain toxicological findings, the results of these additional tests would not likely change the OELs that have been established. Based on these

findings and the comparison of likely exposure concentrations in various scenarios with the recommended OEL. it is concluded that CF_3I can be used safely for firefighting purposes in "not normally occupied" areas and for streaming purposes given that common sense, good practice industrial hygiene procedures are followed.

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Free Executive Summary

Iodotrifluoromethane: Toxicity Review

Subcommittee on Iodotrifluoromethane, Committee on Toxicology, National Research Council

ISBN: 0-309-09307-4, 112 pages, 6 x 9, paperback (2004)

The U.S. military is considering using a compound called iodotrifluoromethane (CF3I) for fire suppression to replace previously-used compounds (halons) that are being phased out because they deplete the ozone layer. This report reviews available toxicological data on CF3I and evaluates the scientific basis of the U.S. Army's proposed exposure limit of 2,000 parts per million (ppm). The report recommends that CF3I be used for fire suppression in normally unoccupied spaces because of its potential to cause cardiac sensitization in test animals. The report also recommends that further genotoxicity testing be conducted (testing for changes in genetic material), and that CF3I be assessed for its potential to cause cancer. Should the Army decide to use CF3I, information should be collected and evaluated on how much of the chemical or any of its degradation products might be released and how often.

Summary

Many halogenated hydrocarbons and other compounds are stratospheric ozone depleters, and the Montreal Protocol on Substances That Deplete the Ozone Layer proposed a ban on them in 1987. In response, the U.S. chemical industry ceased their production and has been phasing out their use ever since. Among the chemicals that were scheduled to be phased out were the chlorofluorobromines (halons). The U.S. military uses halons for fire suppression and extinguishment in electronic equipment, crew compartments in such combat vehicles as aircraft and armored vehicles, machinery spaces in military ships, and high-bay rooms in flight simulators. The U.S. Army is actively engaged in identifying effective, efficient, and safe substitutes for halons in those applications. Among the contenders as a replacement is iodotrifluoromethane (CF_3I).

CF_3I is an odorless, colorless gas with slight solubility in water. It was approved as a substitute for Halon 1301, a common fire extinguisher in total flooding systems under the U.S. Environmental Protection Agency (EPA) Significant New Alternatives Policy (SNAP), in 1997. However, EPA stipulated that any personnel that could possibly be in an area of exposure to CF_3I should be able to escape within 30 seconds (sec), that the employer ensure that no unprotected employees enter the area during CF_3I discharge and that the use of CF_3I be in accordance with the safety guidelines in the latest edition of the National Fire Protection Association (NFPA) standard. The *2001 Standard on Clean Agent Fire Extinguishing Systems* states that a human may be safely exposed to CF_3I at concentrations above the no-observed-adverse-effect level (NOAEL) of 0.2% (2,000 parts per million [ppm]) up to 0.3% (3,000 ppm) for as long as 5 minutes (min). Brief exposure at concentrations above 3,000 ppm is permissible in occupied and

unoccupied spaces (where exposure might occur as a result of an accidental release), but the time for "safe" exposure decreases. NFPA used a NOAEL of 2,000 ppm and a lowest-observed-adverse-effect level (LOAEL) of 4,000 ppm derived from experiments in dogs for a pharmacokinetic model on which it based its determinations of the toxicity of CF_3I.

In May 1999, the U. S. Army Center for Health Promotion and Preventive Medicine at Aberdeen Proving Ground, Maryland, prepared a report that reviewed the toxicity of CF_3I, which it updated in 2002. Those reports did not accept the NFPA *2001 Standard* "safe" exposure limit of 2,000 ppm for CF_3I but instead indicated that any use at a design concentration greater than 2,000 ppm must conform to the EPA SNAP guidelines as published in 1995. The Office of the Surgeon General of the U.S. Army then requested that the National Research Council Committee on Toxicology (COT) independently review the Army's assessment and evaluate the scientific basis of its recommended exposure limit.

THE CHARGE TO THE SUBCOMMITTEE

In response to the Army's request, the National Research Council formed the Subcommittee on Iodotrifluoromethane under COT. Members were chosen for their expertise in toxicology, pharmacology, occupational health, chemistry, biostatistics, physiologically based pharmacokinetic modeling, and risk assessment. The subcommittee was asked to review the toxicologic, toxicokinetic, and related data on CF_3I and to evaluate the scientific basis of the Army's recommended exposure limit of 2,000 ppm in air. It was also asked to identify relevant database deficiencies and to make recommendations for future research need.

THE SUBCOMMITTEE'S APPROACH

To meet its charge, the subcommittee held two public sessions; reviewed materials submitted by the Army and others, including the Army's 1999 and 2002 toxicity review of CF_3I; and assessed current literature relevant to the toxicity of CF_3I, such as the NFPA *Standard 2001*. The subcommittee also conducted a literature search to identify any new materials published since the Army's 2002 report.

Compilation of Various Properties of CF3I
Last update: 9/20/06
Andrew Sonnenschein

Names:
Trifluoroiodomethane, Iodotrifluoromethane, Trifluoromethyliodide, Perfluoromethyl iodide

C.A.S. Number	2314-97-8
European chemical no. (EC)	219-014-5

Property	Value	Units	
Molecular Weight	195.91	g/mol	
Boiling Point at 1 atm	-22.5	Deg C	
Melting Point at 1 atm	-110	Deg C	
Critical temperature	122	Deg C	251.6°F
Density at -32.5 Deg C	2.36	g/cc	
Density at 25 Deg C	2.1	g/cc	
Bond dissociation energy	12.9	KJ/mol	
Critical pressure	4.04	MPA	586 PSIA
Electron affinity	150	KJ/mol	
ionization energy	10.2	eV	
Heat of formation	-589	KJ/mol	
Heat of vaporization	22	kJ/mol	
Refractive index at 42 Deg C	1.379		
Vapor heat capacity	70.9	J/mol-K	
Vapor pressure at 20 deg C	85	psia	
Cost from Ajay North America	317	$/liter	
Acentric factor	0.1796		
Dipole moment	1.68	Debye	
Critical density	4.46	mol/L	
Vapor density	6.9	(air=1)	
Hildebrand solubility parameter	15.2	Mpa^1/2	
Water solubility	0.00862	g/g	

Chemical Purity
Impurities for Lot 102505-FC from Ajay North America (99.77% purity)
R13 0.04%
CH3I 0.04%
R125 0.02%
R23 0.01%
R1216 0.01%
R1225YE 0.01%
CHF2I 0.01%
C2F5I 0.01%
+ 2 unknowns totaling 0.05%

FLUOROchem.net 0.5 kg - £255.00 POUNDS. ≈ $500
001461

SYNQUEST LABS 0.5 kg $299

Temp. (C)	Pressure (psia)	Liquid Density (g/cm^3)	Liquid Cv (kJ/g-K)	Liquid Sound Speed (m/s)	Heat of Vapor. (kJ/g)	Surface Tension (N/m)	Isothermal Compress. (1/psia)
0	33.04	2.20	3.43E-04	473.5	9.69E-02	1.26E-02	2.18E-05
1	34.16	2.20	3.43E-04	470.5	9.67E-02	1.24E-02	2.21E-05
2	35.31	2.19	3.44E-04	467.5	9.64E-02	1.23E-02	2.25E-05
3	36.50	2.19	3.45E-04	464.5	9.61E-02	1.22E-02	2.28E-05
4	37.71	2.18	3.45E-04	461.5	9.58E-02	1.20E-02	2.32E-05
5	38.96	2.18	3.46E-04	458.4	9.55E-02	1.19E-02	2.35E-05
6	40.23	2.17	3.47E-04	455.4	9.53E-02	1.18E-02	2.39E-05
7	41.54	2.17	3.47E-04	452.4	9.50E-02	1.16E-02	2.43E-05
8	42.88	2.16	3.48E-04	449.4	9.47E-02	1.15E-02	2.47E-05
9	44.25	2.16	3.49E-04	446.4	9.44E-02	1.14E-02	2.51E-05
10	45.65	2.15	3.49E-04	443.4	9.41E-02	1.12E-02	2.55E-05
11	47.09	2.15	3.50E-04	440.3	9.38E-02	1.11E-02	2.60E-05
12	48.57	2.14	3.51E-04	437.3	9.35E-02	1.10E-02	2.64E-05
13	50.07	2.14	3.51E-04	434.3	9.32E-02	1.09E-02	2.68E-05
14	51.62	2.13	3.52E-04	431.3	9.29E-02	1.07E-02	2.73E-05
15	53.19	2.13	3.53E-04	428.3	9.26E-02	1.06E-02	2.78E-05
16	54.81	2.12	3.53E-04	425.2	9.23E-02	1.05E-02	2.83E-05
17	56.46	2.12	3.54E-04	422.2	9.20E-02	1.03E-02	2.88E-05
18	58.15	2.11	3.55E-04	419.2	9.17E-02	1.02E-02	2.93E-05
19	59.88	2.11	3.55E-04	416.1	9.13E-02	1.01E-02	2.98E-05
20	61.64	2.10	3.56E-04	413.1	9.10E-02	9.96E-03	3.03E-05
21	63.44	2.10	3.57E-04	410.1	9.07E-02	9.84E-03	3.09E-05
22	65.29	2.09	3.57E-04	407.0	9.04E-02	9.71E-03	3.15E-05
23	67.17	2.09	3.58E-04	404.0	9.00E-02	9.59E-03	3.20E-05
24	69.09	2.08	3.58E-04	401.0	8.97E-02	9.46E-03	3.26E-05
25	71.06	2.08	3.59E-04	397.9	8.94E-02	9.34E-03	3.33E-05
26	73.07	2.07	3.60E-04	394.9	8.90E-02	9.21E-03	3.39E-05
27	75.12	2.07	3.60E-04	391.8	8.87E-02	9.09E-03	3.45E-05
28	77.21	2.06	3.61E-04	388.8	8.83E-02	8.97E-03	3.52E-05
29	79.34	2.05	3.62E-04	385.8	8.80E-02	8.84E-03	3.59E-05
30	81.52	2.05	3.62E-04	382.7	8.77E-02	8.72E-03	3.66E-05
31	83.75	2.04	3.63E-04	379.7	8.73E-02	8.60E-03	3.74E-05
32	86.01	2.04	3.64E-04	376.6	8.69E-02	8.48E-03	3.81E-05
33	88.33	2.03	3.64E-04	373.6	8.66E-02	8.36E-03	3.89E-05
34	90.69	2.03	3.65E-04	370.5	8.62E-02	8.24E-03	3.97E-05
35	93.10	2.02	3.66E-04	367.4	8.59E-02	8.12E-03	4.05E-05
36	95.55	2.02	3.66E-04	364.4	8.55E-02	8.00E-03	4.14E-05
37	98.05	2.01	3.67E-04	361.3	8.51E-02	7.88E-03	4.23E-05
38	100.60	2.00	3.67E-04	358.3	8.47E-02	7.76E-03	4.32E-05
39	103.21	2.00	3.68E-04	355.2	8.43E-02	7.64E-03	4.41E-05
40	105.86	1.99	3.69E-04	352.1	8.40E-02	7.52E-03	4.51E-05
41	108.56	1.99	3.69E-04	349.0	8.36E-02	7.40E-03	4.61E-05
42	111.31	1.98	3.70E-04	346.0	8.32E-02	7.28E-03	4.71E-05
43	114.11	1.97	3.71E-04	342.9	8.28E-02	7.17E-03	4.82E-05
44	116.97	1.97	3.71E-04	339.8	8.24E-02	7.05E-03	4.93E-05
45	119.88	1.96	3.72E-04	336.7	8.20E-02	6.93E-03	5.04E-05
46	122.84	1.96	3.73E-04	333.7	8.16E-02	6.82E-03	5.16E-05
47	125.85	1.95	3.73E-04	330.6	8.12E-02	6.70E-03	5.29E-05
48	128.92	1.94	3.74E-04	327.5	8.07E-02	6.59E-03	5.41E-05
49	132.05	1.94	3.75E-04	324.4	8.03E-02	6.47E-03	5.55E-05
50	135.23	1.93	3.75E-04	321.3	7.99E-02	6.36E-03	5.68E-05

SAFETY DATA SHEET

TRIFLUOROMETHYL IODIDE

Issued: 13/09/2004

Revision No: 1

Sent to: Fluorochem Ltd

1. IDENTIFICATION OF THE SUBSTANCE / PREPARATION AND OF THE COMPANY / UNDERTAKING

Product name: TRIFLUOROMETHYL IODIDE

CAS number: 2314-97-8

Synonyms: IODOTRIFLUOROMETHANE
PERFLUOROMETHYL IODIDE
LQ1

Use / description of product: *

Company name: Fluorochem Ltd
Units 2 & 3
Glossop Brook Business Park
Glossop
Derbyshire
SK13 7AJ
United Kingdom
Tel: +44 (0) 1457 868 921
Fax: +44 (0) 1457 869 360
Emergency tel: +44 (0) 7855 268 577

2. COMPOSITION / INFORMATION ON INGREDIENTS

3. HAZARDS IDENTIFICATION

Main hazards: Possible risk of irreversible effects.

4. FIRST AID MEASURES (SYMPTOMS)

Skin contact: There may be redness or whiteness of the skin in the area of exposure. Irritation or pain may occur at the site of contact.

Eye contact: The eyes may water profusely. The vision may become blurred. There may be pain and redness.

Ingestion: Nausea and stomach pain may occur. There may be vomiting. The casualty may appear intoxicated. Convulsions may occur. There may be loss of consciousness.

Inhalation: Absorption through the lungs can occur causing symptoms similar to those of ingestion. Drowsiness or mental confusion may occur. There may be a feeling of tightness in the chest with shortness of breath.

4. FIRST AID MEASURES (ACTION)

Skin contact: Remove all contaminated clothes and footwear immediately unless stuck to skin. Drench the affected skin with running water for 10 minutes or longer if substance is still on skin. Transfer to hospital if there are burns or symptoms of poisoning.

Eye contact: Bathe the eye with running water for 15 minutes. Consult a doctor.

[cont...]

Ingestion: Wash out mouth with water. Do not induce vomiting. If conscious, give half a litre of water to drink immediately. If unconscious, check for breathing and apply artificial respiration if necessary. If unconscious and breathing is OK, place in the recovery position. Transfer to hospital as soon as possible.

Inhalation: Remove casualty from exposure ensuring one's own safety whilst doing so. If conscious, ensure the casualty sits or lies down. If unconscious and breathing is OK, place in the recovery position. If unconscious, check for breathing and apply artificial respiration if necessary. If breathing becomes bubbly, have the casualty sit and provide oxygen if available. Transfer to hospital as soon as possible.

5. FIRE-FIGHTING MEASURES

Extinguishing media: Suitable extinguishing media for the surrounding fire should be used. Carbon dioxide. Dry chemical powder. Alcohol or polymer foam. Halons. Use water spray to cool containers.

Exposure hazards: In combustion emits toxic fumes.

Protection of fire-fighters: Wear self-contained breathing apparatus. Wear protective clothing to prevent contact with skin and eyes.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Evacuate the area immediately. If outside do not approach from downwind. If outside keep bystanders upwind and away from danger point. Do not attempt to take action without suitable protective clothing - see section 8 of SDS.

Environmental precautions: Alert the neighbourhood to the presence of fumes or gas.

Clean-up procedures: Clean-up should be dealt with only by qualified personnel familiar with the specific substance. Transfer to a closable, labelled salvage container for disposal by an appropriate method.

7. HANDLING AND STORAGE

Handling requirements: Do not puncture or incinerate this cylinder. Avoid direct contact with the substance. Ensure there is exhaust ventilation of the area. Do not handle in a confined space.

Storage conditions: Store in cool, well ventilated area. Keep container tightly closed. Keep away from sources of ignition. Avoid contact with water or humidity.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering measures: Use only in a chemical fume hood.

Respiratory protection: Self-contained breathing apparatus must be available in case of emergency.

Hand protection: Impermeable gloves.

Eye protection: Safety goggles. Ensure eye bath is to hand.

Skin protection: Impermeable protective clothing.

9. PHYSICAL AND CHEMICAL PROPERTIES

State: Gas

Colour: Colourless to pink.

[cont...]

Boiling point/range°C: -22.5 C

Melting point/range°C: <-78 C

10. STABILITY AND REACTIVITY

Stability: Stable under normal conditions.

Conditions to avoid: Heat. Flames.

Haz. decomp. products: In combustion emits toxic fumes of carbon dioxide / carbon monoxide.

11. TOXICOLOGICAL INFORMATION

Chronic toxicity: To the best of our knowledge, the toxicological properties of this product have not been fully determined. It is recommended that this product be treated as harmful, and is only used by staff trained in the handling of hazardous chemicals.

Routes of exposure: Refer to section 4 of SDS for routes of exposure and corresponding symptoms.

12. ECOLOGICAL INFORMATION

Persistence and degradability: No data available.

Bioaccumulative potential: No data available.

Other adverse effects: No data available.

13. DISPOSAL CONSIDERATIONS

Disposal operations: Arrange disposal as special waste, by licensed disposal company.

Disposal of packaging: No-return cylinder. Caution: empty cylinder may contain hazardous residue. Arrange for collection by specialised disposal company.

NB: The user's attention is drawn to the possible existence of regional or national regulations regarding disposal.

14. TRANSPORT INFORMATION

ADR / RID

UN no: 3163 **ADR Class:** 2

Classification code: 2A

Shipping name: LIQUEFIED GAS, N.O.S.

Labelling: 2.2 **Hazard ID no:** 20

IMDG / IMO

UN no: 3163 **Class:** 2.2

EmS: F-C,S-V **Marine pollutant:** .

Labelling: 2.2

[cont...]

IATA / ICAO

UN no: 3163 **Class:** 2

Packing instructions: 200

Labelling: 2.2

15. REGULATORY INFORMATION

Hazard symbols: Irritant.

Risk phrases: R68: Possible risk of irreversible effects.

Safety phrases: S23: Do not breathe gas.

S24/25: Avoid contact with skin and eyes.

S26: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

S28: After contact with skin, wash immediately with plenty of ...

S36/37/39: Wear suitable protective clothing, gloves and eye / face protection.

Note: The regulatory information given above only indicates the principal regulations specifically applicable to the product described in the safety data sheet. The user's attention is drawn to the possible existence of additional provisions which complete these regulations. Refer to all applicable national, international and local regulations or provisions.

16. OTHER INFORMATION

Legal disclaimer: The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. This company shall not be held liable for any damage resulting from handling or from contact with the above product.

Iodotrifluoromethane: Toxicity Review (2004)

Board on Environmental Studies and Toxicology (BEST)

TABLE 2-1 Physical Properties of CF_3I

Physical or Chemical Property	Value or Description
Chemical Abstracts Service no. (CAS)	2314-97-8
European Chemical no. (EC)	219-014-5
Molecular weight	195.91
Physical state at 20°C	Gas
Melting point	–110°C (166°F)
Boiling point at 1 atm	–22.5°C (8.5°F)
Liquid density at -32.5°C	2.36 g/mL
Liquid density at 25°C	g/mL
Odor threshold	Odorless
Solubility in water	Slight
Vapor pressure at 25°C	78.4 psia
Pressure-temperature curve	log psia = 5.7411-1146.82/T/K
Critical pressure	586 psia (estimated)
Critical temperature	122°C (estimated)
Critical volume	225 cm^3/mole (estimated)
Heat of formation	–141 kcal/mole
Heat of vaporization	5.26 kcal/mole
Electron affinity	150 ± 20 kJ/mole
Refractive index (liquid) at 42°C	1.379
Dipole moment	1.68 debye
Vapor heat capacity	16.9 cal/mole-K
C-I bond disassociation energy	54 kcal/mole
Vapor density (air = 1)	6.9[a]

[a]Data from PTCL 2003.

Abbreviations: g/mL, gram per milliliter; cm^3/mol, cubic meter per mole; kcal/mole, kilocalorie per mole; kJ/mole, kilojoule per mole; cal/mole-K, calorie per mole Kelvin; psia, pounds per square inch absolute.
Source: Adapted from Moore et al. 1994 (see Appendix B).

$\nu = .134\ mm^2/s$